Üçüncü Sektör Sosyal Ekonomi Dergisi
Third Sector Social Economic Review
59(1) 2024, 37-51
doi: 10.15659/3.sektor-sosyal-ekonomi.24.01.2285

Research Article

The Relation of Non-Fungible Tokens (Nft) with Bitcoin and Ethereum: a New Asset or a Derivative of Crypto Currencies?

Değiştirilemez Tokenlerin (Nft) Bitcoin ve Ethereum ile İlişkisi: Yeni Bir Varlık mı Kripto Para Türevi mi?

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Makale Geliş Tarihi	Makale Kabul Tarihi
11.10.2023	**18.01.2024**

Abstract
NFT is a new form of digital art and a financial asset which was introduced in 2017. Since NFT is based on blockchain technology and its trade is dominated by Ethereum, one expects that NFT is interrelated with Bitcoin and Ethereum. The purpose of this study is to analyze the long-term and short-term relation of NFT with Bitcoin and Ethereum with Johansen Cointegration analysis and Granger Causality test. The time span split as before and after July 2022. The results suggest that there is no long-term relation of NFT with Bitcoin and Ethereum. In the short-term, NFT Granger causes Ethereum in the first period. In the second period, no short-term causal relation of NFT is evidenced with Bitcoin and Ethereum. The results suggest that NFT is evolving to a new form of art and a financial asset largely independent from crypto market.
Keywords: *NFT, Bitcoin, Ethereum, Financial Instrument, Causality*
Jel Codes: *G1, G15, F65*

Öz
NFT, 2017 yılında yaratılan yeni bir dijital sanat formu ve finansal varlıktır. NFT, blok zincir teknolojisine dayandığından ve ticareti Ethereum'un hakimiyetinde olduğundan, NFT'nin Bitcoin ve Ethereum ile ilişkili olması beklenmektedir. Bu çalışmanın amacı NFT'nin Bitcoin ve Ethereum ile uzun vadeli ve kısa vadeli ilişkisini Johansen Eşbütünleşme testi ve Granger nedensellik testi ile analiz etmektir. Zaman aralığı Temmuz 2022 öncesi ve sonrası olarak bölünmüştür. Sonuçlar, NFT'nin Bitcoin ve Ethereum ile uzun vadeli bir ilişkisinin olmadığını göstermektedir. İlk periyotta, kısa vadede NFT Ethereum'un Granger nedeni olmaktadır. İkinci dönemde NFT'nin Bitcoin ve Ethereum ile kısa vadeli bir nedensellik ilişkisi kanıtlanmamıştır. Sonuçlar, NFT'nin yeni bir sanat biçimine ve kripto pazarından büyük ölçüde bağımsız bir finansal varlığa dönüştüğünü göstermektedir.
Anahtar Kelimeler: *NFT, Bitcoin, Ethereum, Finansal araç, Nedensellik*
Jel Kodları: *G1, G15, F65*

1. Introduction

Although Bitcoin is defined as a decentralized intangible currency based on peer-to-peer networking and it is exchangeable with traditional currencies, it does not qualify the characteristics of a traditional currency. Therefore, its pricing is more complicated than other currencies. Bitcoin promises to solve the problems associated with existing currencies, but it has now its own problems such as high volatility.

Önerilen Atıf /Suggested Citation
Koçoğlu, Ş., 2024, The Relation of Non-Fungible Tokens (Nft) with Bitcoin and Ethereum: a New Asset or a Derivative of Crypto Currencies?, *Üçüncü Sektör Sosyal Ekonomi Dergisi*, 59(1), 37-51.

Figure 1: The price of Bitcoin between 1.03.2021-30.06.2023

Source: Yahoo.finance (2023). BTC. https://finance.yahoo.com/

Figure 1 shows that there is high volatility in Bitcoin pricing and the market is losing value in recent years. The bubble created in 2019 because of the COVID-19 burst after the end of the pandemic. The investors somehow considered the cryptocurrencies as safe haven during the pandemic and the price rose dramatically. Following the normalization period, the Bitcoin market started to lose value. Regarding the dramatic price increases and decreases, studies analyze if these extreme movements in the price of Bitcoin are due to economic, financial and technical factors or they are just speculative bubbles. There are claims regarding its extraordinary volatility and bubbles and some researchers argue that Bitcoin is a speculative financial instrument with high volatility and bubbles. Countries have varied attitudes against it as China forbids its usage while there are popular platforms where Bitcoin can be used for transactions. Although cryptocurrency market is still very volatile and experts' arguments about its nature are varying, blockchain technology will be here for a long time with its limitless opportunities and innovations brought by its novel technology. NFT (Non-Fungible Token) for instance is an innovation brought by blockchain technology and with the rise of artificial intelligence and Metaverse universe, NFT has turned to be a new investment area. NFT cannot be swapped and gives the owner a unique code which is impossible to replicate or change. Therefore, it is like a unique painting drawn by Picasso, but the difference is that the art is created with digital technologies. Crypto.com (2023) states that the most expensive NFTs ever sold are Merge, (US$91.8M), The First 5000 Days (US$69.3M) and Clock (US$52.7M) which are all digitally created piece of art. Thus, anyone can download the digital format of the NFTs but the original owners of them are protected with blockchain technology. Coinmarketcap.com (2023) state that NFT market is dominated by Ethereum based transactions. Therefore, NFTs are expected to be interrelated with not only Bitcoin but also Ethereum.

Figure 2: The price of NFT between 1.03.2021-30.06.2023

Source: Yahoo.finance (2023). BTC. https://finance.yahoo.com/

Figure 2 shows that, NFT's popularity was dramatic when it was first introduced. Especially when the market considered the Metaverse as the new reality in the world, investors considered NFT as the future of art to be created and used in the new visual universe. However, with the decreasing interest in the cryptocurrency market due to the end of the pandemic and the bankruptcy of FTX affected negatively all the assets created with blockchain technology. Moreover, ChatGPT spurred the interest of high technology market which turned the eyes from Metaverse and NFT to AI. Promoted as the new art, NFT was expected to be differed from the cryptocurrencies and to move independently despite the same technology behind them. The reason is that NFTs have unique characteristics such as that they are art but not currency and also its very much existence depends on the popularity of Metaverse and virtual reality. Therefore, any technology more promising than Metaverse negatively affect the value of NFTs. Because of this complex relations, NFT market is well deserved to be analyzed. The purpose of this study is to explore NFT market, how this new art form is related with cryptocurrency market and the investors' attitude against this new financial market.

2. Literature Review

The first innovation of block chain technology is Bitcoin and now any asset based on block chain is interrelated with Bitcoin. For that purpose, understanding what Bitcoin is and how its price is determined is essential before discussing NFT. There is no clarity regarding the behavior of cryptocurrencies and the investors' approach to Bitcoin is still a mystery. Dyhrberg, (2016a) defines Bitcoin as an instrument between currency and commodity as it combines the features of both gold and dollar. Urquhart (2016) proves that the Bitcoin market is not even efficient in the weak form and argues that this is due to being a new and now well-known asset. In his next study, Urguhart (2017) adds that price clustering phenomenon is observed at round numbers regarding the prices of Bitcoin. Baek and Elbeck (2015) proves that Bitcoin is much more volatile compared to S&P 500. The focus of the literature about the Bitcoin market has been the bubbles and the speculation as high volatility is so obvious in the market. The bubbles in the Bitcoin market revealed by Cheung et al. (2015) and they investigated three big bubbles related with the big events in the market over the period 2011-2013. Corbet et al. (2018) tried to detect the bubbles and the role of blockchain position, liquidity in the pricing of Bitcoin and Ethereum. Based on the analysis, they stated that there are temporary bubbles in both currencies and the short-lived effects of each factor on the currencies are observed. In addition to positive bubbles, Fry et al. (2016)

found negative bubbles after 2014 in Ripple and Bitcoin market and stated that the spillover is from Ripple to Bitcoin as the fall in prices of Bitcoin is followed by a value decrease in Ripple. Regarding the reasons behind the dramatic level of volatility in Bitcoin, Blau (2017) argue the existence of bubbles but adds that the high volatility is not because of speculative trading contrary to claims of high speculation in the Bitcoin market. However, Bouoiyour et al. (2015) consider Bitcoin as risky and argue that pricing is highly prone to speculative behaviors of investors which is found to be the dominant factor in the price formation. Ciaian et al. (2016) support the argument of speculation in Bitcoin and reveal that speculative behaviors of investors play role both in short and long run price formation of Bitcoin.

In addition to studies discussing the features of Bitcoin price, the linkage of Bitcoin with other assets has been investigated in the literature because as it is stated by Baur et al. (2018) Bitcoin is largely used as an investment tool rather than a medium of exchange. Corbet et al. (2018) supports the arguments of Fry et al. (2016) regarding the relation between Bitcoin and Ripple and show that Bitcoin has influence over Ripple and Litcoin. To understand the relation between cryptocurrency market and the fundamental market forces, they analyzed the relation of Bitcoin, Lite and Ripple with VIX, MSC GSCI Total Index, the US$ Broad exchange Rate, the S&P 500 Index, gold price and the Markit ITTR110 Index. They came up with an interesting conclusion that the macroeconomic factors were proved to be less significant than cryptocurrency market related factors and Baek and Elbeck (2015) also prove that the price of Bitcoin is determined by sellers and buyers but not by economic factors. Similar results achieved by Ji et al. (2018) as they revealed a weak relation of Bitcoin with MSCI World, MSCI China, PIMCO Investment Grade Corporate Bonds, S&P GSCI Commodity, gold and the US dollar. Ji et al. (2018) underlined that Bitcoin is not integrated with financial assets especially when it is not at the bear market state. Regarding hedging capabilities of Bitcoin, Dyhrberg (2016b) showed that Bitcoin is not affected by the FTSE Index while Bitcoin is found to be a hedge against uncertainty in the study conducted by Bouri et al. (2017) for 14 countries. Although Bitcoin is referred as a good hedge, Briere et al. (2015) underlines the fact that despite its weak relation with other assets, one should keep in mind that Bitcoin is a new asset and its position in the market will change in the future. However, Bouri et al (2018) argue that Bitcoin is not isolated from global financial markets as they proved asymmetric and nonlinear relation of Bitcoin with S&P GSCI Commodity and gold prices by using the ARDL models. To sum up, there is no consensus in the literature about the nature of Bitcoin and the pricing of Bitcoin. However, it is commonly stated that Bitcoin is highly speculative and the pricing mainly depend on the crypto currency market specific factors.

While there are numerous studies analyzing Bitcoin, researchers show little interest in the NFT market especially in finance. Ante (2023) analysis the long run and causal relation between NFTs and its submarkets between June 2017 and May 2021 and document that the prices in NFT market is determined by the submarkets of NFTs. Wang et al. (2021) suggest that the value of NFT is affected by many factors such as age, liquidity and how rare it is. These characteristics suggest that NFT has unique properties which are irrelevant in currency and cryptocurrency market. Pinto-Gutiérrez et al. (2022) use vector autoregressive models and show that Bitcoin is a good predictor of NFT. Moreover, they suggest that NFTs are related with Bitcoin and Ethereum and suggest that the popularity of NFT is related with the surge in the cryptocurrency market. Ante (2022) similarly find the impact of both Ethereum and Bitcoin prices in the NFT. In addition to NFT's relation between cryptocurrencies, Luo et al. (2023) analyze the impact of social media. They provide that tweets about the NFT market or words about specific projects positively affect the market. Therefore, they suggest that their popularity not only depend on cryptocurrencies, but NFT market has its own dynamics. Kong et al. (2021) also suggest that NFTs are financial assets which attract the attention of investors. They argue that as a new financial asset NFTs are highly risky assets with very high risk and volatility. Moreover, they argue that experienced investors take advantage of the market by buying NFTs cheap and selling at higher prices. To sum up, Bitcoin and other crypto assets are complex financial assets with high volatility and high expected return. Although the literature does not define the cryptocurrencies in a precise way, they all agree that Bitcoin and other crypto currencies still carry some characteristics of money. However, NFT is completely new product of block chain technology, and its characteristics are unique while Ante (2021) suggests that NFTs still depend on large cryptocurrencies such as Ethereum. In the next section, the hypothesis that NFT market is interrelated with crypto currencies namely Bitcoin and Ethereum will be tested. This

study completes the literature by analyzing the long run and short run relation of NFTs with major cryptocurrencies namely Bitcoin and Ethereum by using Johansen Cointegration test and Granger Causality test.

3. Data and Methodology

3.1. Data

The daily USD prices of NFT,[1] Bitcoin[2], Ethereum[3] are compiled from Yahoo Finance covering the period 1 March 2021 and 30 June 2023. Table 1 shares the descriptive statistics of the variables. Figure 2 shows the structural break starting at the second quarter of 2022. Therefore, the time period is split into two part before the analysis. The first period overs the time from 1 March 2021 to 30 June 2022 and the second period covers the time from 1 July 2022 to 30 June 2023. The structural breaks are proved to exist based on the results of unit root tests and the break point are determined visually. All the analysis are conducted for both Phase 1 and Phase 2. Table 1 shows the descriptive statistics of the variables. For the analysis, log value of three variables is used to normalize the time series.

Table 1: Descriptive statistics

	1. Phase			**2. Phase**		
Mean	0.17688	44383.19	2865.701	0.013418	22542.1	1564.967
Median	0.148065	43537.51	2857.41	0.01652	22219.77	1594.915
Maximum	0.812074	67566.83	4812.087	0.028237	30695.47	2120.006
Minimum	0.013106	19017.64	993.6368	0	15787.28	1038.192
Stand. devi.	0.126568	10541.57	860.107	0.008295	4155.896	254.3848
Skewness	2.130761	-0.02513	0.118688	-0.78952	0.245516	-0.13258
Kurtosis	9.173823	2.477999	2.350669	2.102109	1.933176	1.881726
Jarque-Bera	1141.947	5.580407	9.698959	50.18119	20.97572	20.08788
Probability	0	0.061409	0.007832	0	0.000028	0.000043
Sum	86.14067	21614616	1395597	4.897562	8227868	571213.1
Sem Sq. Dev	7.785477	5.40E+10	3.60E+08	0.025047	6.29E+09	23555040
Observations	487	487	487	365	365	365

[1] NFT USD (NFT-USD) CCC - CoinMarketCap. Currency in USD
[2] Bitcoin USD (BTC-USD)CCC - CoinMarketCap. Currency in USD
[3] Ethereum USD (ETH-USD) CCC - CoinMarketCap. Currency in USD

3.2. Methodology

Firstly, correlation coefficients of the variables are calculated. To be able to compare, not only the relation of NFT with Bitcoin and Ethereum is analyzed but also the relation between Bitcoin and Ethereum is explored. To test the long-term relation between the variables Johansen Cointegration analysis (1988, 1995) is used. The equation tested is shared below.

$$\Delta Y_t = \pi Y_{t-1} \sum_{i=1}^{a-1} \Gamma_i \Delta Y_{t-i} + Bx_t + \varepsilon_t$$

$$\pi = \sum_{i=1}^{k} a_i - 1$$

$$\Gamma = -\sum_{j=i+1}^{k} a_j$$

After long term relation test, the causality between the variables are analyzed by Granger Causality (Granger,1969) test. The following equation is the Granger causality test (Granger,1969) for two variables:

$$\Delta Y_t = a_1 + \sum_{i=1}^{1} \beta_{1i} \Delta X_{t-i} \sum_{i=1}^{m} \mu_{1i} \Delta Y_{t-i} + \delta_{1i} ECT_{t-1} + u_{1t}$$

$$\Delta X_t = a_2 + \sum_{i=1}^{1} \beta_{2i} \Delta X_{t-i} \sum_{i=1}^{m} \mu_{2i} \Delta Y_{t-i} + \delta_{2i} ECT_{t-1} + u_{2t}$$

4. Empirical Findings

Table 2 shares the correlation coefficient between NFT, Bitcoin and Ethereum for Phase 1 and 2. In Phase 1, the correlation coefficient of NFT with Bitcoin and Ethereum is 0.79 and 0.38 respectively and the correlation coefficient between Bitcoin and Ethereum is 0.67. The correlation between NFT and Bitcoin is even higher than the correlation between Bitcoin and Ethereum. In the first phase, NFT is more connected with the crypto currencies as the correlation of NFT with Bitcoin Ethereum declined to 0.23 and 0.08. In the second phase the correlation between Bitcoin Ethereum raised to 0.91 which is very high. High correlation between the variables do not cause any problems for the methodology used in this paper. Johansen Cointegration analysis and Granger Causality test have no assumption about collinearity.

Table 2: Correlation Analysis

Phase 1			
	NFT	**BTC**	**GETH**
NFT	1	0.794927	0.382078
BTC	0.794927	1	0.666211
ETH	0.382078	0.666211	1

Phase 2

	NFT	BTC	ETH
NFT	1	0.239107	0.083653
BTC	0.239107	1	0.910072
ETH	0.083653	0.910072	1

Table 3 shows the unit root results of the variables. Unit root test is prerequisite before Johansen Cointegration analysis as the test can be applied to series non-stationary at level and stationary at first difference. In the first two columns Augmented Dickey Fuller (Dickey & Fuller, 1979) with intercept and trend and intercept models both at level and first difference are shared. The last two columns show the unit root test by Phillips and Perron (1988) both for intercept and trend and intercept models. The unit root tests for NFT, Bitcoin and Ethereum show that the variables have unit root at level and turn to be stationary at first difference in both two phases.

Table 3. Unit root tests

1.PHASE

	Augmented Dickey Fuller (Intercept)	Augmented Dickey Fuller (Trend & Intercept)	Phillips-Perron (Intercept)	Phillips-Perron (Trend & Intercept)
NFT(LEVEL)	-0.349998	-1.533477	-0.377073	-1.630576
	(0.9145)	(0.8169)	(0.9102)	(0.7797)
NFT (FIRST DIFFERENCE)	-24.21337*** (0.0000)	-24.25022*** (0.0000)	-24.29705*** (0.0000)	-24.33530*** (0.0000)
BTC(LEVEL)	-0.315471	-1.114718	-0.309628	-1.114802
	(0.9198)	(0.9244)	(0.9207)	(0.9243)
BTC (FIRST DIFFERENCE)	-23.29989*** (0.0000)	-23.36831*** (0.0000)	-23.26286*** (0.0000)	-23.33226*** (0.0000)
ETH(LEVEL)	-0.937331	-0.913925	-0.937331	-0.873148
	(0.7760)	(0.9524)	(0.7760)	(0.9568)
ETH (FIRST DIFFERENCE)	-23.33320*** (0.0000)	-23.60589*** (0.0000)	-23.31490*** (0.0000)	-23.58898*** (0.0000)

2.PHASE

NFT(LEVEL)	-1.660040	-2.475493	-1.686054	-2.505828

	(0.4508)	(0.3402)	(0.4375)	(0.3252)
NFT (FIRST DIFFERENCE)	-18.88618*** (0.0000)	-18.87722*** (0.0000)	-18.88618*** (0.0000)	-18.87722*** (0.0000)
BTC(LEVEL)	-0.994344	-1.737830	-1.056754	-1.773092
	(0.7551)	(0.7702)	(0.7336)	(0.7160)
BTC (FIRST DIFFERENCE)	-18.43157*** (0.0000)	-18.42290*** (0.0000)	-18.43561*** (0.0000)	-18.42606*** (0.0000)
ETH(LEVEL)	-2.507492	-2.779511	-2.474234	-2.779511
	(0.1145)	(0.2059)	(0.1227)	(0.2059)
ETH (FIRST DIFFERENCE)	-19.76515*** (0.0000)	-19.74507*** (0.0000)	-19.76967*** (0.0000)	-19.74986*** (0.0000)

() MacKinon (1995) p values. *,**,*** denote the significance at 10%, 5% and 1% respectively.

Table 4 shares the Johansen Cointegration test results. In the first phase, there is cointegration relation between only Bitcoin and Ethereum which is not highly significant and there is cointegration between the variables in the second phase. For both first and second phase, there is not statistically significant cointegrating relation between NFT, Bitcoin and Ethereum. There is no long-term relation of NFT with Bitcoin and Ethereum. Since there is no evidence of long-term relation of NFT with Bitcoin and Ethereum, in the next step short term causality is tested with VAR Granger.

Table 4: Johansen Cointegration Analysis

1.PHASE				
		Eigenvalue	Trace statistic	Probability
NFT-BTC	None	0.019268	9.384198	0.3310
	At most 1	1.30E-05	0.006258	0.9364
NFT-ETH	None	0.022471	11.08238	0.2065
	At most 1	0.000265	0.127924	0.7206
BTC-ETH	None	0.026059	14.24488	0.0765*
	At most 1	0.003144	1.517953	0.2179
2.PHASE				
NFT-BTC	None	0.011994	4.945409	0.8146
	At most 1	0.002021	0.710099	0.3994
NFT-ETH	None	0.017122	8.444397	0.4192
	At most 1	0.006765	2.382489	0.1227
BTC-ETH	None	0.053015	20.21932	0.0090***
	At most 1	0.001691	0.609312	0.4350

*,**,*** denote the significance at 10%, 5% and 1% respectively.

After the long-term relation is tested, Granger Causality test is applied for short term causality. Table 5 summarizes the Granger Causality test results. In the first period, there is bidirectional causality running from NFT to Ethereum and from Bitcoin to Ethereum. Although not strongly significant, BTC also seems to Granger cause NFT. In the second period, there is only one unidirectional causality between

Bitcoin and Ethereum. In the second period, no short-term causality of NFT is observed with Ethereum and Bitcoin.

Table 5: Granger causality test results

1.Phase			
Dependent	**Independent**	F-Statistic	**Df**
NFT	BTC	5.552329*	2
		(0.0623)	
BTC	NFT	5.159905	2
		(0.0758)	
NFT	ETH	3.164422	2
		(0.2055)	
ETH	NFT	9.038349**	2
		(0.0109)	
BTC	ETH	1.916820	1
		(0.1662)	
ETH	BTC	6.360852	1
		(0.0117)**	
2.Phase			
NFT	BTC	0.036829	1
		(0.8478)	
BTC	NFT	1.784903	1
		(0.1815)	
NFT	ETH	0.068586	1
		(0.7934)	
ETH	NFT	0.716083	1
		(0.3974)	
BTC	ETH	4.633496	2
		(0.0314)**	
ETH	BTC	8.018440	2
		(0.0046)***	

*,**,*** denote the significance at 10%, 5% and 1% respectively.

5. Conclusion and Discussion

The Non-Fungible Tokens or NFTs are new generation digital ownership codes given for art. An original Van Gogh painting can be owned by only one person or entity, so does an NFT. For instance, one of the most expensive NFTs so far is The First 5000 Days which is an example of digital art and it can be simply found by googling and can be downloaded by anyone. However, a painting of Van Gogh can be also digitally downloaded or be replicated but this does not deteriorate the value of the Starry Night. Therefore, the essential point is who owns the original version. NFT can identify a digital piece of art as the original one and appoint the sole ownership by blockchain technology.

Behind the NFT and crypto currencies there is block chain technology and NFT transactions are dominated by Ethereum. Therefore, one expects these two markets closely linked and especially a strong relation is expected among NFTs, Bitcoin and Ethereum. The purpose of this study is to analyze if these three instruments are closely linked. The time period is split into two parts as after the second quarter of 2022, NFT market seems to dramatically lose value which suggests a structural break. For the analysis, the long run relation is tested with Johansen Cointegration analysis and short term causality is tested with Granger Causality test. The results suggest that for both periods NFT has no long term relation with Bitcoin and Ethereum while in the second period there is long run relation between Bitcoin and Ethereum. For the short-term relation, there is bidirectional causality from NFT to Ethereum and from Bitcoin to Ethereum in the first phase. In the second phase, there is unidirectional Granger causality between Ethereum and Bitcoin. In the first period, NFT has short term relation with crypto currencies, but this relation disappears in the second phase. Since the third quarter of 2022, NFT seems to move independently from crypto currencies. These findings contradict with the studies by Pinto-Gutiérrez et al. (2022) and Ante (2022). However, as suggested by Wang et al. (2021), NFT has its own characteristics and features that affect the value. When NFT was first introduced, it was considered as an innovative product of blockchain and therefore it was assumed that NFT and crypto currencies got related. However, other technologies namely Metaverse and virtual reality dominated NFT market as investors considered usability of virtual art connected to the development of Metaverse. However, with the rise of AI programs such as ChatGPT, investors turned their eyes away from Metaverse. The popularity of NFT deteriorated so as the price of NFT and thus the connection of NFT with Bitcoin and Ethereum disappeared after the second quarter of 2022. Kong et al. (2021) suggest that NFT is a new financial asset and Luo et al. (2023) argue that NFT has its own factors such as popularity in social media. Elbeck (2015) state that Bitcoin price is determined by demand-supply relation rather than economic factors and NFT pricing seems depend on buyers and sellers in the NFT market too. NFT is a completely new market with its own dynamics, a new form of art and a new financial asset as suggested by Kong et al. (2021). The main limitation of this study is that the NFT market is so immature, and investors and art lovers are only recently discovering the opportunities of NFT. Therefore, a deeper analysis with longer time periods is necessary. In the future, the relation of NFT with other macroeconomic variables should be analyzed as well.

Final Notes

NFT has a complex identity as it is the new form art, a new type of investment and a derivative of blockchain technology.

Long term test reveal that for both periods NFT has no long-term relation with Bitcoin and Ethereum while in the second period there is long run relation between Bitcoin and Ethereum

Granger causality test show that there is bidirectional causality from NFT to Ethereum and from Bitcoin to Ethereum in the first phase. In the second phase, there is unidirectional Granger causality between Ethereum and Bitcoin

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Araştırma Makalesi

The Relation of Non-Fungible Tokens (Nft) with Bitcoin and Ethereum: a New Asset or a Derivative of Crypto Currencies?

Değiştirilemez Tokenlerin (Nft) Bitcoin ve Ethereum ile İlişkisi: Yeni Bir Varlık mı Kripto Para Türevi mi?

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Genişletilmiş Özet

Kripto para piyasası hala çok değişkendir ve uzmanların doğasına dair argümanları değişkenlik gösterse de blockchain teknolojisi ve kripto paralar daha uzun yıllar insanların hayatında önemli yer tutacak gibi görünmektedir. Mesela NFT (Non-Fungible Token), blockchain teknolojisinin getirdiği yeni bir inovasyon olup, yapay zeka ve Metaverse evreninin yükselişiyle yeni bir yatırım alanı haline gelmiştir. NFT değiştirilemez ve sahibine kopyalanması veya değiştirilmesi mümkün olmayan benzersiz bir kod verir. Dolayısıyla Picasso'nun çizdiği eşsiz bir tablo gibidir ancak farkı, sanatın dijital teknolojilerle yaratılmasıdır. Crypto.com (2023), şimdiye kadar satılan en pahalı NFT'lerin Merge (91,8 milyon ABD Doları), The First 5000 Days (69,3 milyon ABD Doları) ve Clock (52,7 milyon ABD Doları) olduğunu ve bunların hepsinin dijital olarak yaratılmış sanat eserleri olduğunu belirtmektedir. Böylece herkes NFT'lerin dijital formatını indirebilir ancak orijinal sahipleri blockchain teknolojisiyle korunur. Coinmarketcap.com (2023), NFT pazarının Ethereum tabanlı işlemlerin hakimiyetinde olduğunu belirtmektedir.

Özellikle piyasa Metaverse'ü dünyadaki yeni gerçeklik olarak değerlendirirken, yatırımcılar da NFT'yi yeni görsel evrende yaratılacak ve kullanılacak sanatın geleceği olarak görüyorlardı. Ancak salgının sona ermesi ve FTX piyasasının iflasından sonra kripto para piyasasına olan ilginin azalması, blockchain teknolojisiyle oluşturulan tüm varlıkların olumsuz etkilenmesine neden olmuştur. Ayrıca ChatGPT, yüksek teknoloji pazarının ilgisini çekti ve bu da gözleri Metaverse ve NFT'den uzağa çevirdi. Yeni sanat olarak tanıtılan NFT'nin, kripto para birimlerinden farklı olması ve arkasında aynı teknoloji olmasına rağmen bağımsız hareket etmesi bekleniyordu. Bunun nedeni, NFT'lerin para birimi değil sanat olmaları gibi benzersiz özelliklere sahip olmaları ve ayrıca varlıklarının büyük ölçüde Metaverse'ün ve sanal gerçekliğin popülaritesine bağlı olmalarıdır. Bu nedenle Metaverse'den daha umut verici herhangi bir teknoloji, NFT'lerin değerini olumsuz yönde etkilemektedir. Bu karmaşık ilişkiler nedeniyle NFT pazarı analiz edilmeyi hak etmektedir. Bu çalışmanın amacı NFT piyasasını, bu yeni sanat formunun kripto para piyasasıyla nasıl ilişkili olduğunu ve yatırımcıların bu yeni finansal piyasaya karşı tutumunu araştırmaktır.

Bitcoin'i analiz eden çok sayıda çalışma olmasına rağmen araştırmacılar NFT pazarına, özellikle de finans alanında çok az ilgi göstermişlerdir. Wang vd. (2021), NFT değerinin yaş, likidite ve ne kadar nadir olduğu gibi birçok faktörden etkilendiğini ileri sürmektedir. Bu özellikler, NFT'nin para birimi ile kripto para piyasasıyla ilgisi olmayan benzersiz özelliklere sahip olduğunu göstermektedir. Pinto-Gutiérrez vd. (2022) vektör otoregresif modelleri kullanarak Bitcoin'in NFT'nin iyi bir öngörücüsü olduğunu göstermişlerdir. Dahası, NFT'lerin Bitcoin ve Ethereum ile ilişkili olduğunu öne sürmüşler ve

NFT'nin popülaritesinin kripto para piyasasındaki artışla ilgili olduğunu iddia etmişlerdir. Ante (2022) benzer şekilde hem Ethereum hem de Bitcoin fiyatlarının NFT'deki etkisini bulmuştur. Luo vd. (2023), NFT'nin kripto para birimleri arasındaki ilişkisine ek olarak sosyal medyanın etkisini de analiz etmişlerdir. NFT pazarıyla ilgili tweetlerin veya belirli projelerle ilgili sözlerin pazarı olumlu etkilediğini belirtmişlerdir. Bu nedenle popülerliklerinin sadece kripto paralara bağlı olmadığını, NFT pazarının da kendine has dinamikleri olduğunu öne sürmüşlerdir. Kong vd. (2021) ayrıca NFT'lerin yatırımcıların ilgisini çeken finansal varlıklar olduğunu iddia etmişlerdir. Yeni bir finansal varlık olarak NFT'lerin çok yüksek risk ve volatiliteye sahip, oldukça riskli varlıklar olduğunu savunmuşlardır. Üstelik deneyimli yatırımcıların NFT'leri ucuza alıp daha yüksek fiyatlara satarak piyasadan faydalandıklarını öne sürmüşlerdir. Özetlemek gerekirse, Bitcoin ve diğer kripto varlıklar yüksek volatiliteye ve yüksek beklenen getiriye sahip karmaşık finansal varlıklardır. Literatür kripto para birimlerini kesin bir şekilde tanımlamasa da Bitcoin ve diğer kripto para birimlerinin hala paranın bazı özelliklerini taşıdığı konusunda herkes hemfikirdir. Ancak NFT, blok zincir teknolojisinin tamamen yeni bir ürünüdür ve özellikleri benzersizdir.

Bu amaçla NFT ile kripto paralar arasındaki uzun vadeli ilişki ve kısa vadedeki nedensellik ilişkileri incelenmiştir. Tablo 2, Aşama 1 ve 2 için NFT, Bitcoin ve Ethereum arasındaki korelasyon katsayısını paylaşmaktadır. Aşama 1'de NFT'nin Bitcoin ve Ethereum ile korelasyon katsayısı sırasıyla 0,79 ve 0,38, Bitcoin ve Ethereum arasındaki korelasyon katsayısı ise 0,67'dir. NFT ile Bitcoin arasındaki korelasyon, Bitcoin ve Ethereum arasındaki korelasyondan bile daha yüksektir. İlk aşamada NFT'nin Bitcoin Ethereum ile korelasyonu 0,23 ve 0,08'e düşmektedir. İkinci aşamada Bitcoin Ethereum arasındaki korelasyon 0,91'e yükselmektedir. NFT, Bitcoin ve Ethereum için yapılan birim kök testleri, değişkenlerin düzeyde birim köke sahip olduğunu ve her iki aşamada da birinci farklarda durağanlaştığını göstermektedir. Tablo 4'te Johansen Eşbütünleşme testi sonuçları paylaşılmaktadır. İlk aşamada sadece Bitcoin ve Ethereum arasında çok anlamlı olmayan bir eşbütünleşme ilişkisi varken, ikinci aşamada değişkenler arasında eşbütünleşme söz konusudur. Hem birinci hem de ikinci aşamada NFT, Bitcoin ve Ethereum arasında istatistiksel olarak anlamlı bir eşbütünleşme ilişkisi bulunmamaktadır. NFT'nin Bitcoin ve Ethereum ile uzun vadeli bir ilişkisi yoktur. NFT'nin Bitcoin ve Ethereum ile uzun vadeli ilişkisine dair bir kanıt bulunmadığından bir sonraki adımda kısa vadeli nedensellik VAR Granger ile test edilmiştir. Tablo 5 Granger Nedensellik testi sonuçlarını özetlemektedir. İlk dönemde NFT'den Ethereum'a ve Bitcoin'den Ethereum'a doğru çift yönlü bir nedensellik söz konusudur. Her ne kadar çok anlamlı olmasa da BTC'nin NFT'ye de neden olduğu görülmektedir. İkinci dönemde ise Bitcoin ile Ethereum arasında tek yönlü nedensellik bulunmaktadır. İkinci dönemde ise Ethereum ve Bitcoin ile NFT arasında kısa vadeli bir nedensellik gözlemlenmemiştir.

Non-Fungible Tokens veya NFT'ler sanata verilen yeni nesil dijital sahiplik kodlarıdır. Orijinal bir Van Gogh tablosu yalnızca tek bir kişiye veya kuruluşa ait olabilir, tıpkı bir NFT gibi. Örneğin, şimdiye kadarki en pahalı NFT'lerden biri, Google'da arama yaparak kolayca bulunabilen ve herkes tarafından indirilebilen bir dijital sanat örneği olan İlk 5000 Gün'dür. Ancak Van Gogh'un bir tablosu da dijital olarak indirilebilir veya çoğaltılabilir ancak bu, Yıldızlı Gece'nin değerini bozmaz. Bu nedenle asıl önemli olan orijinal versiyonun kime ait olduğudur. NFT, blockchain teknolojisi sayesinde dijital bir sanat eserini orijinal olarak tanımlayabilir ve tek sahipliğini atayabilir.

NFT ve kripto para birimlerinin arkasında blok zincir teknolojisi yer almakta ve NFT işlemlerine Ethereum hâkim olmaktadır. Bu nedenle, bu iki pazarın özellikle NFT'ler, Bitcoin ve Ethereum arasında ilişki olması beklenmektedir. Bu çalışmanın amacı bu üç enstrümanın birbiriyle yakından bağlantılı olup olmadığını analiz etmektir. 2022'nin ikinci çeyreğinden sonra NFT pazarının önemli ölçüde değer kaybettiği ve bu durumun yapısal bir kırılmaya işaret ettiği göz önüne alındığında, dönem iki bölüme ayrılmıştır. Analiz için uzun dönemli ilişki Johansen Eşbütünleşme analizi ile, kısa dönemli nedensellik ise Granger Nedensellik testi ile test edilmiştir. Sonuçlar her iki dönem için de NFT'nin Bitcoin ve Ethereum ile uzun dönemli ilişkisinin olmadığın göstermiştir. Kısa dönemli ilişki için ilk aşamada NFT'den Ethereum'a ve Bitcoin'den Ethereum'a doğru çift yönlü bir nedensellik söz konusudur. İkinci aşamada ise Ethereum ile Bitcoin arasında tek yönlü Granger nedenselliği bulunmaktadır. İlk dönemde NFT'nin kripto para birimleriyle kısa vadeli bir ilişkisi vardır ancak ikinci aşamada bu ilişki ortadan kalmaktadır. 2022 yılının üçüncü çeyreğinden itibaren NFT, kripto para birimlerinden bağımsız hareket ediyor görünmektedir. Bu bulgular Pinto-Gutiérrez vd. (2022)'nin çalışmalarıyla çelişmektedir. Ancak

Wang vd (2021)'nin önerdiği gibi , NFT'nin kendine has özellikleri ve değerini etkileyen özellikleri vardır. NFT ilk piyasaya sürüldüğünde blok zincirinin yeni ve yenilikçi bir ürünü olarak düşünüldü ve bu nedenle NFT ile kripto para birimleri ilişkilendirildi. Bununla birlikte, yatırımcılar sanal sanatın kullanılabilirliğinin Metaverse'ün gelişimiyle bağlantılı olduğunu düşündüğünden, Metaverse ve sanal gerçeklik gibi diğer teknolojiler NFT pazarına hakim oldu. Ancak ChatGPT gibi yapay zeka programlarının yükselişiyle yatırımcılar gözlerini Metaverse'den uzaklaştırdı. NFT'nin fiyatının düşmesi ile NFT'nin popülaritesi kötüleşti ve dolayısıyla NFT'nin Bitcoin ve Ethereum ile bağlantısı 2022 yılının ikinci çeyreğinden sonra ortadan kalktı. Elbeck (2015), Bitcoin fiyatının ekonomik faktörlerden ziyade arz-talep ilişkisi tarafından belirlendiğini ve NFT fiyatlandırmasının NFT pazarında da alıcı ve satıcılara bağlı göründüğünü belirtmektedir. NFT, Kong vd.'nin (2021) önerdiği gibi kendi dinamikleri olan bir varlıktır ve ayrıca yeni bir sanat formu ve yeni bir finansal varlıktır. Bu çalışmanın ana sınırlaması, NFT pazarının henüz olgunlaşmamış olması ve yatırımcıların ve sanatseverlerin NFT fırsatlarını ancak yeni keşfetmesidir. Bu nedenle daha uzun zaman aralıklarıyla daha derin bir analiz yapılması gerekmektedir. Gelecekte NFT'nin diğer makroekonomik değişkenlerle ilişkisinin de analiz edilmesi gerekmektedir.